

TSUBAKI STEEL MILL CHAINS

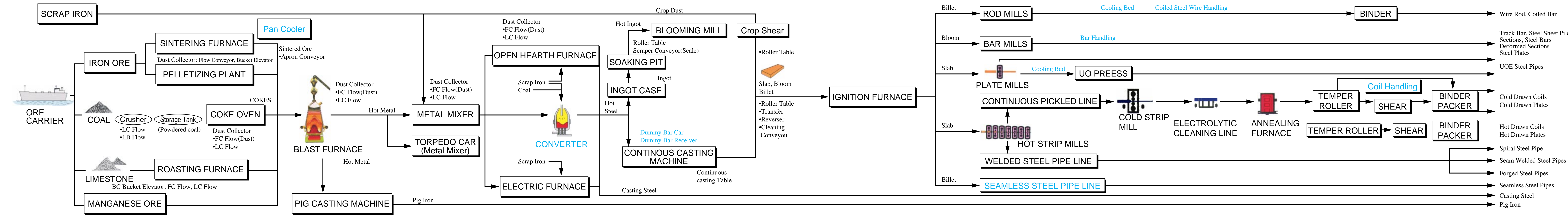


NEXT

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graph LR
    A[RAW MATERIAL PROCESS] --> B[IRON MAKING PROCESS]
    B --> C[STEEL MAKING PROCESS]
    C --> D[ROLLING PROCESS]
    D --> E[FINISH ROLLING PROCESS]
    E --> F[REFINING PROCESS]
  
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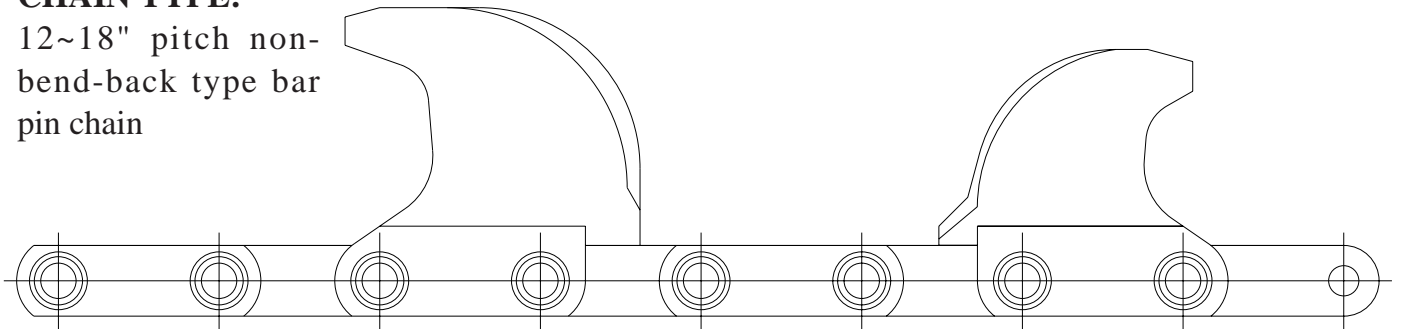
RAW MATERIAL PROCESS → IRON MAKING PROCESS → STEEL MAKING PROCESS → ROLLING PROCESS → FINISH ROLLING PROCESS → REFINING PROCESS



Dummy Bar Car

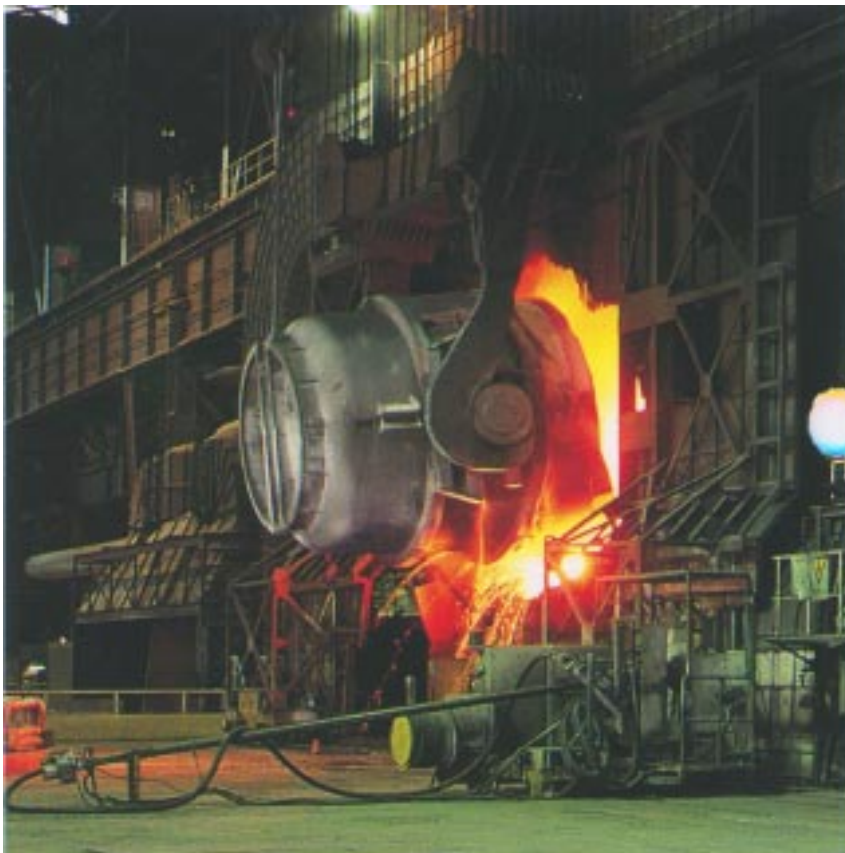
CHAIN TYPE:

12~18" pitch non-bend-back type bar pin chain



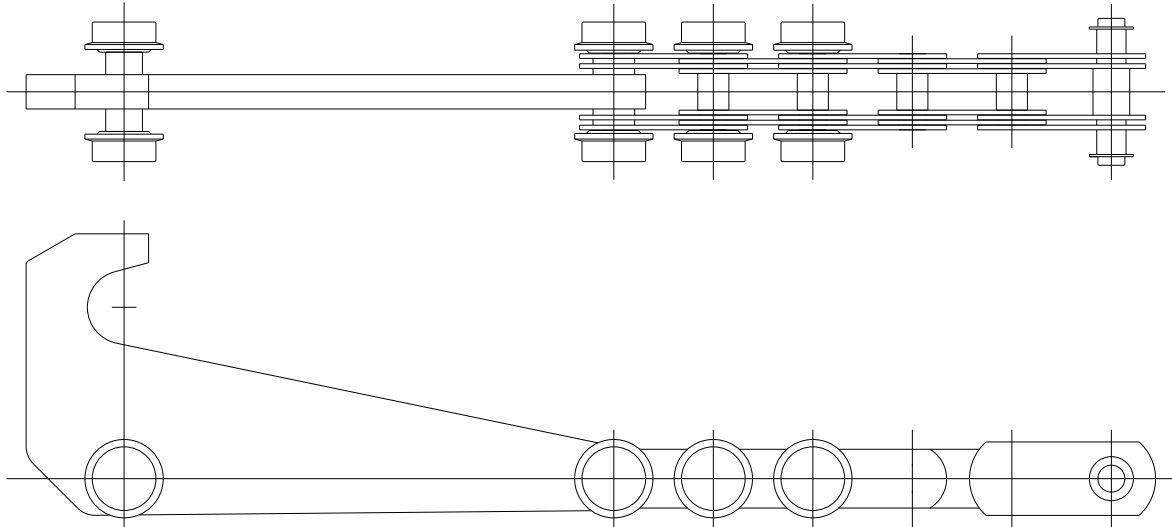
BACK

CONVERTER



BACK

Dummy Bar Receiver

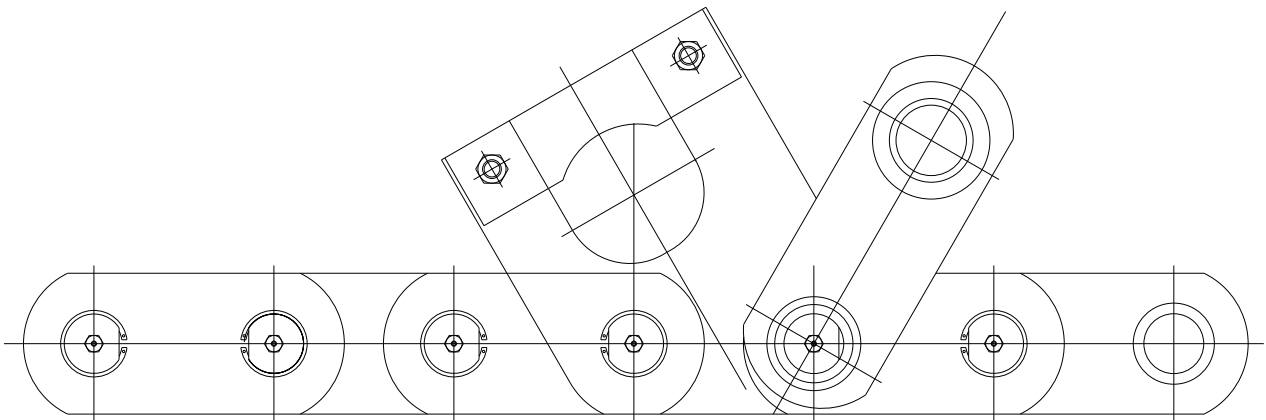


CHAIN TYPE:

10~12" pitch double strand bushed roller chain with a special type of dog

BACK

Pan Cooler



CHAIN TYPES:

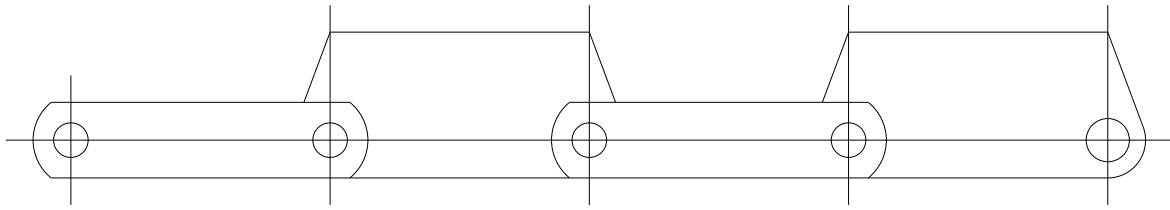
1. For conveying Iron Ore, Coal, Limestone, etc.

120mm~180mm pitch bushed chain with hinged attachment.

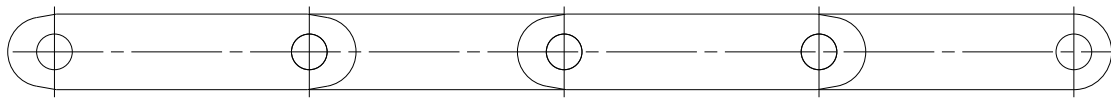
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Cooling Bed

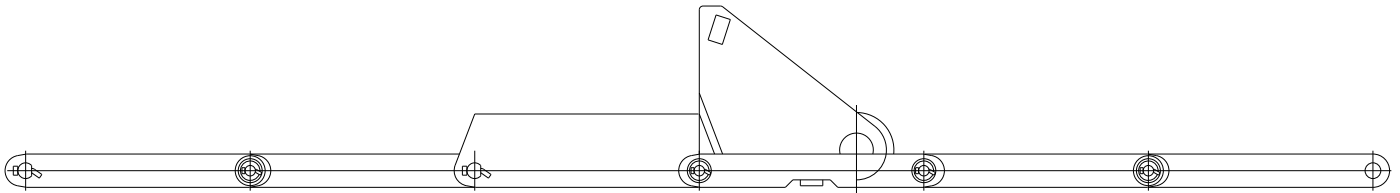
Type(I) chain is for Inlet and Outlet conveyor cooling bed



Type(II) chain is for Cooling bed

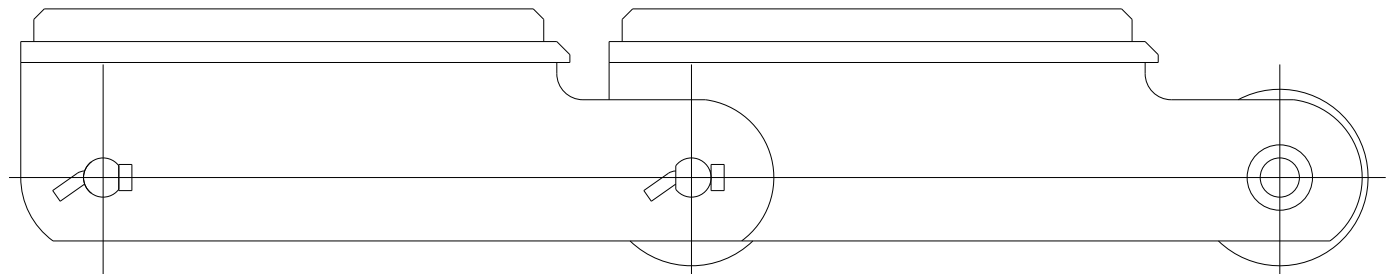


Billet or Broom Transfer



This is an example of chain for conveying billet or broom. It is NF type and the pitch is ranged between 200~400mm.

Slab Cooling Conveyor

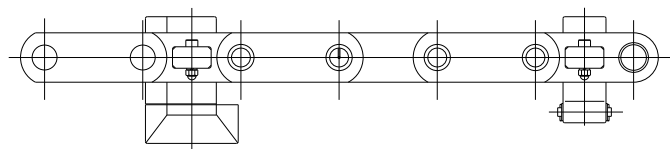
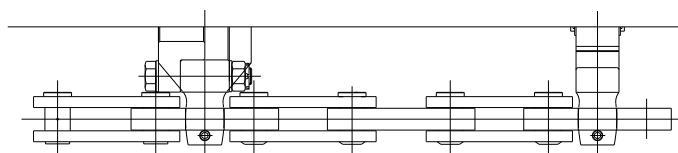
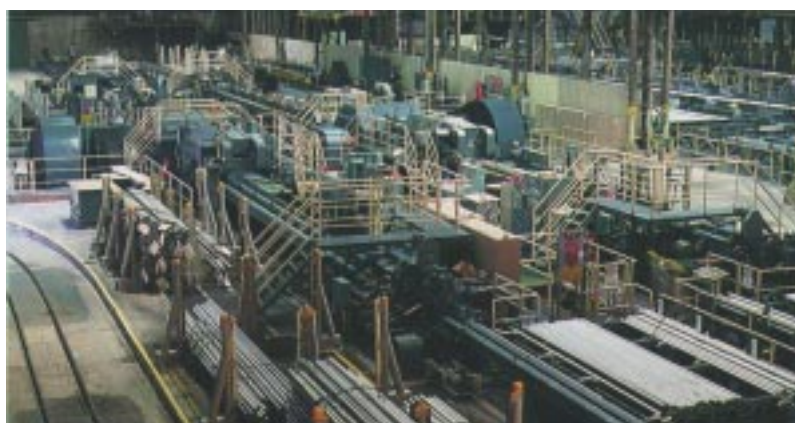
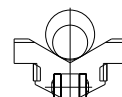
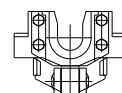
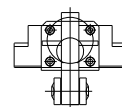
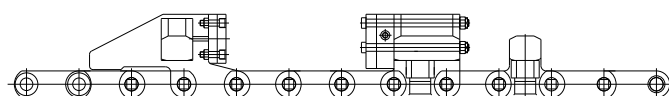


Usually, the chains of pitch ranged between 400~700mm and of average tensile strength ranged between 200~500 tons are used. 13CrSUS is the common material of Pins and Bushings. The average chain life is 4~5 years.

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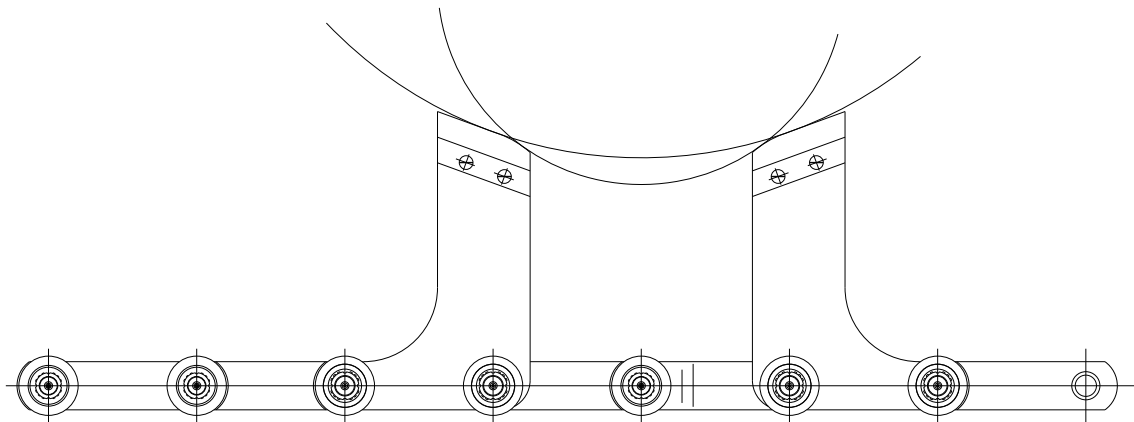
SEAMLESS STEEL PIPE LINE

The chains used in this kind of line, with anti-shock and anti-wear functions for high speed operation (260m/min), are specialized for bar-inserter use, shell-inserter use and for bar-stripper use.



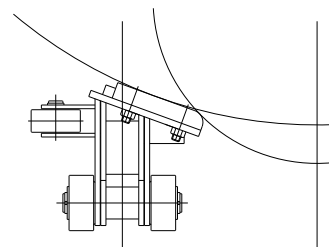
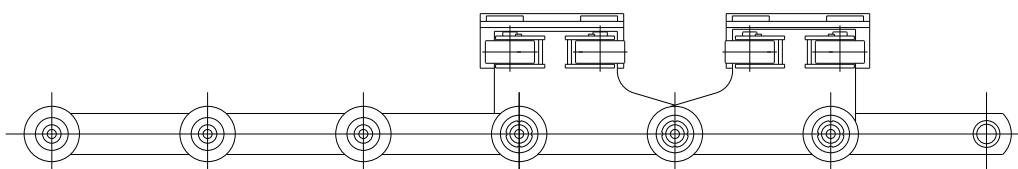
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Coil Handling



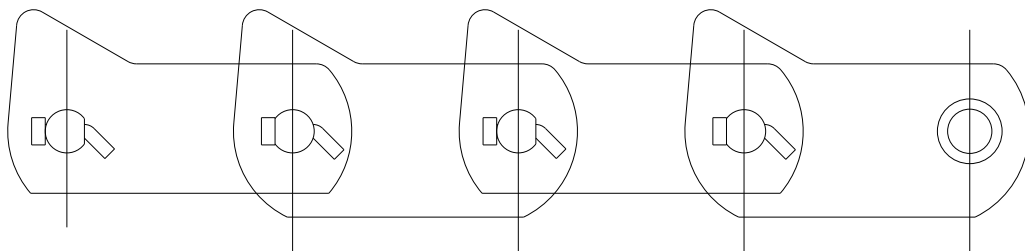
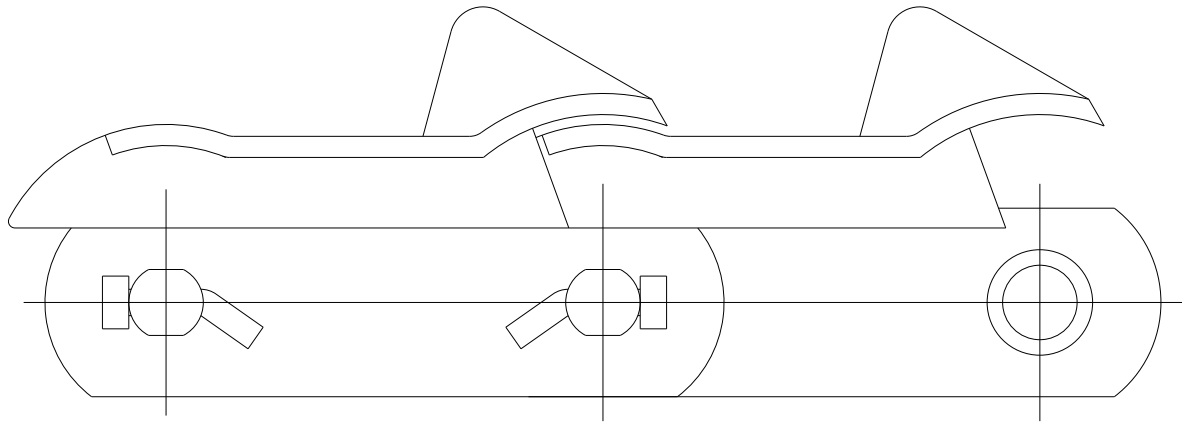
CHAIN TYPE:

12~24" pitch bushed roller chain with special "V" shaped attachment and outboard bearing roller or double strands of bearing roller chain with "V" shaped slat for up end type conveyor



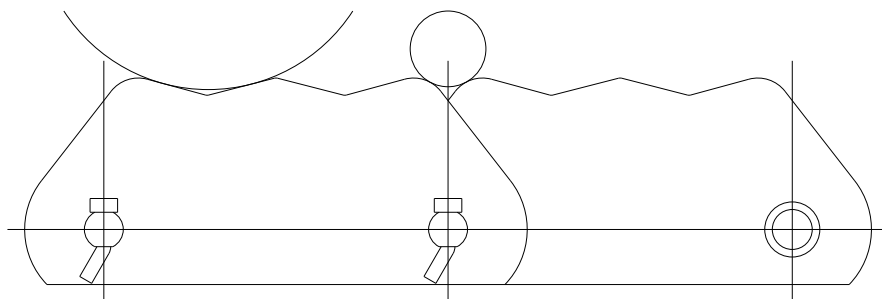
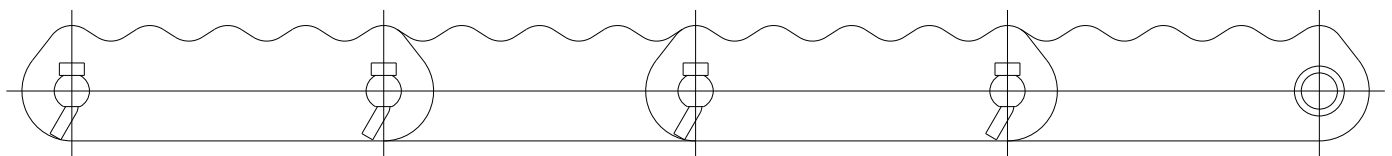
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Coiled Steel Wire Handling



BACK

Bar Handling



BACK



BACK

THE IRON MAKING PROCESSES

1. RAW MATERIAL PROCESS

RAW MATERIAL FOR MAKING IRON:

The major materials for making iron are **iron ore, coal** and **limestone**, also small quantities of **iron sand, pyrite cinder, manganese iron ore**, etc., are added.

2. IRON MAKING PROCESS

MAKING OF PIG IRON

The raw materials, **iron ore, coke** and **limestone**, are conveyed to the top of the blast furnace by belt conveyor, and put into the furnace. From the lower part of the furnace, where more than 30 **TUYERES** are, 1,100 degree Celsius air is blown in, and the iron ore is reduced to the carbon abundant **pig iron** by chemical reaction. **Pig iron** is discharged approximately every two (2) hours. Next to the blast furnace, is an air-heating furnace that supplies heated air to the blast furnace through TUYERES. However, in this process, almost no chain used.

3. STEEL MAKING PROCESS

CONVERTER

The difference between **pig iron** and steel is mainly the quantity of carbon. More than 1.7% of pig iron is carbon, while steel contains less than that. The less carbon the iron contains, the more resilient and tougher it becomes. On the contrary, the more carbon it

contains, the stronger and harder it becomes **but** carbon reduces elasticity and makes it brittle. The Converter is a furnace for making pig iron into steel by removing the carbon and any impurities. As oxygen is blown on to the melted pig iron, the temperature reaches approximately 1,650 Celsius degrees.

MAKING STEEL

The melted pig iron discharged from blast furnace is transported to the Converter by a hot insulation cart called the Torpedo Car. A pipe, called a Lance, is inserted into the pig iron and pure oxygen is blown in. The carbon, phosphor, manganese and other impurities are burned out, and the iron becomes more elastic. The oxygen blowing time is between 30 to 40 minutes. One blowing can produce 160 to 250 tons of steel. This is the system of contemporary steel making technology.

4. ROLLING PROCESS

CONTINUOUS CASTING

The steel produced from the Converter is poured into ingot cases. Once made into ingots, they are then made into various shaped billets by using a Cogging Mill. Billets are the base materials for making pipe, plate and section steel. However, the most recent and prevailing way is to bring the steel as it is produced from the Converter to the Continuous Casting Machine and pour it into the machine to make slab and bloom directly.

MAKING BILLET

The steel produced from the Converter is transported to the Continuous Casting Machine in a large bucket-like ladle. The steel

is poured into the Tan-dish, at the mouth of the casting machine, and is gradually cooled by water while it is poured, and becomes harder and harder. It is then cut into certain lengths. The Continuous Casting is more energy saving than conventional methods, and produces quality-stabilized steel. Sumitomo Metal employs this system for making 90% of its billet making. In these billet-conveying lines, chains are used.

4. FINISH ROLLING PROCESS

MAKING WIRE RODS

Wire rod is used for making nails, wires and wire ropes. Nowadays, it is also used in Automobile Tires.

As the red-hot billet is relayed to the All-Continuous Wire Strip Mill it becomes thinner and thinner while it is relayed through 28 stations of strip roll. At the finish process, the wire rod is picked up at speeds of 90 meters per second.

MAKING BAR STEEL

Bar Steel means square bar, round bar, plate steel, spring steel, etc. These are rolled out of the heated steel billet through Small/Medium Size Rolling Machines. The steel billet is carried between a pair of rotating Rollers to where it will be rolled. By changing the configuration of the Roll, various shaped wire rods are manufactured. As it is difficult to produce the final product from a raw billet in one rolling, the billet has to be rolled several times to gradually change the configuration.

USE OF WIRE RODS

Shafts, bolts, nuts, rivets, steel reinforcements usually seen in construction fields, etc., are the typical uses of wire rods. Wire rod can be used as it is or used after secondary processing. Wire rods, once shipped as thick rods, are now, for the convenience of secondary processing, shipped as coil.

USE OF SECTION STEEL

Thick large section steel, requiring a certain degree of strength, is used as beams for skyscrapers, as stays of underground constructions and bridges, and also is the fundamental material of buildings. Welded section steel is mainly used in buildings, offices, schools, gymnasiums and condominiums.

MAKING SECTION STEEL

When making large section steel, first the bloom is heated, next it is relayed in sections through rollers, similar to the wire rod process, to produce the rail shape of section steel. For welded section steel, the steel plate made in the Hot Strip mill is cut into lengths and the three pieces are welded simultaneously into section steel. This sections are then made into various sizes.

MAKING THICK PLATES

The slab is reheated and run through the thick plate roller to produce a thick plate, 27.5cm thick with a diameter of 5.1m. The thick plate roller is able to roll a slab, equal to the thickness of 4 rollers. **Imagine the power required, to take a red hot slab that has been dipped in cold water, and while the steam is still rising from it, roll it into flat plates.**

USE OF THIN PLATES

Thin plate is used in the manufacturing of car bodies, refrigerators, washing machines, microwave ovens, vacuum cleaners and other

household electrical appliances. Also steel doors, bookstands, desks and the like. Also thin plate is widely used in Zinc plating, color printing and for roofing materials. I'm sure we can all think of another hundred uses for thin plate.

MAKING THIN PLATE

In the making of thin plate two types of rollers are used, a hot roller and a cold roller. The hot roller, also known as a Hot Strip Mill, takes the heated slab, runs it through the 7 roller sections of the mill and produces plates as thin as 1mm. This process is performed at speeds close to 80km/h. The cold roller, also known as the Cold Strip Mill, takes hot coil, and at normal operating temperature runs it through the rollers to produce plate as thin as 0.25mm. This process reaches speeds of 150km/h

MAKING SEAM WELDED STEEL PIPE AND FORGED STEEL PIPE

Seam welded steel pipe is made by taking the steel plate produced in the Hot Strip Mill cutting it into lengths, rolling it into pipe and electrically resistance heat welding the seam. In the manufacturing of Forged steel pipe, the cut steel plates are heated to about 1400°C, rolled into pipe shape and forged together. At top speed, 457m of pipe can be produced per minute. An advantage of this system is that no matter what kind of pipe is being produced the process can run continually.

MAKING SEAMLESS PIPE

A machine called a 'Piasa', hollows out a heated billet using a cannonball like object to push out the middle of the billet. Next a shaft is inserted in the hollowed billet and using a special rolling machine, a thick, fixed external diameter steel pipe is produced. This system produces high quality seamless pipe and is a specialty of Sumitomo Metal.

USE OF SEAMLESS PIPE

Seamless pipe is used in areas where high quality steel pipe is a required. For example, power plant boilers, nuclear power plants, chemical manufacturing plants, oil wells and natural gas wells. This kind of pipe is especially important in the drilling of oil where pipe is pushed up to 1000m into the earth. Seamless pipe is manufactured for conditions that require a high quality or special nature pipe, for example, Hydrogen Sulfide and Carbon gas drilling areas, areas of extreme cold, like Alaska, areas of high pressure like the bottom of the ocean and oil drilling.

Seamless Steel Pipe Line

A heated billet is hollowed out using a 'Piasa' machine to produce seamless pipe. Depending on the required diameter, the mandrill method or the plug method may be used.

Bar Handling

A formation and conveying process that produces various shapes and sizes of shaped steel and thick plates from slabs, blooms and billets.

Pan Cooler

The Pan Cooler is a conveyor that transports the sintered ore from the sintering furnace to the blast furnace.

Scale Conveyor

The Scale Conveyor (Scraper) transports the collected scale of slabs, blooms and billets.